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AN EVALUATION OF POTENTIAL GIANT SEQUOIA TREE HAZARDS AT GIANT FOREST, SEQUOIA NATIONAL PARK

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At the request of Sequoia National Park's Resources Management Staff, I visited the Giant Forest area from October 27-29, 1992. The objective was to evaluate potentially hazardous conditions involving giant sequoias. Park personnel who provided valuable information and assistance during the evaluation included Tom Warner, Charlie Castro, Tom Tschohl, and Larry Bancroft.

Observations

Most of our time was focused on one giant sequoia (#6794 in Park tree hazard inventory) located directly behind the registration/gift shop building for Giant Forest Lodge. This tree is over 21 feet in diameter at breast height (dbh) and 255 feet tall. It leans conspicuously over the registration building and front parking lot and has two large fire scars at the base. The larger fire scar is 15 feet across at the widest part and is on the side of the tree toward the lean (front side). A smaller fire scar about 8 feet wide is on the opposite side of the tree (back side). Much of the wood underneath the fire scars is well decayed. We did not excavate this decayed wood to see how deep it extended.

Two large, well deteriorated, white fir stumps are located on the back side of the sequoia and within 16 feet of its base. Both stumps contained Heterobasidion annosum (annosus root disease) conks with fresh pore surfaces. The stumps were probably cut 25 or more years ago and pre-date the use of borax in the Park. Borax is a chemical applied to stump tops that prevents annosus root disease from becoming established. Sequoia Park started treating stumps with borax about 1970.

A second giant sequoia that failed near Round Meadow in May of 1992 was also examined. This tree was 13 feet in diameter and fell over one morning during

calm weather. Here, also, we found numerous well-decayed white fir stumps containing fresh conks of the annosus root disease pathogen. Several standing white fir trees adjacent to the disease pocket showed various stages of decline or death typical of root disease. Portions of the sequoia's root system were decayed, although the root system was also growing on top of a large rock that may have reduced the strength of the structural roots.

Discussion and Conclusions

Factors contributing to the potential hazard of the Giant Forest Lodge sequoia include the fire scars and associated wood decay, the lean toward the registation building, and the presence of annosus root disease. We know that the same form of Heterobasidion annosum that infects white fir will infect giant sequoia (Otrosina, W.J., T. Chase, and F.W. Cobb. 1992. Allozyme differentiation of intersterility groups of Heterobasidion annosum isolated from conifers in the western United States.. Phytopathology 82: 540-545.) Each of these factors alone would not automatically make this tree highly hazardous, but all of them acting together create a situation that cannot be ignored.

The most detailed and complete study of giant sequoia failures was completed by Douglas D. Piirto as part of a doctoral thesis in 1977 (Piirto, D.D., 1977. Factors associated with tree failures of giant sequoia. Technical Report No. 35.01.177, Univ. of Calif. Forest Products Lab., Richmond, CA. 155pp.). His work included data on 33 sequoias that had failed throughout the species' range in California. Information that Dr. Piirto presented and conclusions he made that have a direct bearing on the Giant Forest situation include:

1. Annosus root disease was the most common factor found in giant sequoia failures involving the root system (12 out of 29).

2. Sequoias tended to fail in the direction of the largest fire scars (18 out of 18).

3. Fire scars provided pathways for the entry of decay fungi.

Resources Management maintains an excellent data base of past tree failures and an inventory of hazardous trees. The data show there have been 3 giant sequoia tree that have failed at the roots in the Giant Forest area during the 22 year period between 1970 and 1992. This suggests or predicts, in a very broad way, that one big tree could fail every 7-8 years. Although the total number of sequoia root failures is low, the population of specimen size trees at Giant Forest is small and probably less than 100.

The following conclusions/recommendations were reached based on published scientific evidence, data available from Resources Management, and observations made at Giant Forest.

1. The Park's use of borax has undoubtedly prevented the start of many root disease centers, but root disease is currently well established at specific sites either through natural causes or from trees cut prior to the use of borax.

2. The Park should continue mapping annosus root disease centers as they are found and confirmed in all developed sites.

3. Giant sequoias growing within or adjacent to known root disease centers should be given special attention and evaluated very carefully as far as potential hazards.

4. It would be very useful for the Park to collect additional data such as size and location of fire scars, direction of lean, dhb, and height for all sequoias over 6 feet dbh in developed sites.

4. There is too much evidence showing that the sequoia behind the Lodge Registration building represents a danger to property, vehicles and people - doing nothing about the situation is unacceptable.